NLM-SMU
Visible Human TransPacific Demonstration
Content

National Library of Medicine [www.nlm.nih.gov]

- The world's largest biomedical library. 5 million items--books, journals, technical reports, manuscripts, microfilms, photographs and images
- Producer and distributor of MEDLINE and 40 other biomedical databases.
- Producer of GENBANK and other biotechnology information sources
- Divisions include library operations, R&D centers, and international centers for database distribution
- Communications Engineering Branch R&D (archive.nlm.nih.gov) produces
  - DocView (document delivery via the Internet)
  - MARS (automated data entry system to create MEDLINE)
  - WebMIRS (multimedia biomedical databases of x-rays and text

- Uses a prototype Telemedicine application
  - Gathers information useful in the design and operation of Interactive Biomedical Image Collaboratories
    - Such Collaboratories would use large datasets across broadband international networks
- Proposed demonstration will attempt to gather information
  - Using large images, application includes:
    - Interactive biomedical image segmentation
    - Labeling
    - Classification
    - Indexing using large images.

Application Objective

- Interactive biomedical image segmentation, labeling classification, indexing using large images (Visible Human Dataset, VH)
  - Calculates and fills areas in the segment with metaballs and renders them
  - Attachment of anatomical terms using Unified Medical Language System
  - Creation of multilingual object database
  - VH data transferred to/from researcher
- Motivation
  - Centralized repository, database management more easily done

  - Updates in one place ensuring authenticity and reliability.
  - Biomedical image libraries (in number and size) are sure to grow
  - Current licensees of VH dataset number 1000+ worldwide

Visible Humans

- Dataset size/International importance
  - Multilingual labeling of the dataset proposed
- Investigators
  - Sapporo Medical University
  - Others potential exist in Europe
- Future online access of segmented human anatomy
  - Worldwide vital resource
- One model use
  - NLM developed browser software
    - Selecting a cropped volumetric subset (e.g. the heart).
    - Client receives volume of interest, all labels
    - Future generic client rendering tool

- Present: Application currently in a beta
  - Viewer module
  - Displays, sagital and longitudinal, coronal sections of a human body
  - Runs under Apple Openstep environment on several platforms
  - Annotation Module part of the architecture
- Future: SGI-based version
  - Enhanced features: viewing at any angle
  - Beta form in about six months

- Visible Human Viewer software (ver. 1.0): Between client workstation at SMU and a Sun server at NLM
  - Version 1.0 runs under Apple OpenStep Enterprise on NT.
  - Version 1.2 runs under Apple OpenStep OS on an Intel platform
  - Version 1.3 runs under Apple OS X on a G3 platform
- **Objective:** Make a very rough measure of the activities of a user of the Visible Human Viewer software from a remote site
  - Repeatable USER PROFILE defined and use is approximately measured
    - Typical set of common operations a remote anatomist follows using the Visible Human Viewer software.

Demonstration Procedure

- Preliminary
  - Establish NetMeeting 98 audio/video connection NLM-SMU for coordination link
  - Establish teleconference number for demonstration coordination, troubleshooting as needed
  - Verify SMU can reach NLM via ping, traceroute, and NFS over satellite
  - Record ping and traceroute results
  - SMU verifies directory listing of server data: /home2/gibn

- Day X (X=1-8) of satellite link availability:

- SMU begins first run using VH USER PROFILE procedure (see references)
- x.1 Notify demonstration email list upon start/uses voice loop
  - Coordinate with other testing by network engineers
- x.2 Record starting from the point at which one hits the enter key after changing the filename to the display of the first image (landmark image try #1) for Subtask 2.1 of the VH USER PROFILE
- x.3 Record the start and stop times for each of the subsequent image viewing attempts (5) until each subtask is completed

Demonstration Procedure

- x.4 Repeat x.2 and x.3 for the remaining subtasks (2.2, 2.3, 2.4) of the VH USER PROFILE
  - Stop at display of last image (identification of lower end of femur)
- x.5 Notify demonstration email list upon stop of each testing run
- x.6 Repeat this complete procedure x.1-x.5 as often as possible during scheduled test time (minimum twice)
- x.7 Send results to demonstration email list after each day's runs

Test Plan Schedule

- Assumptions
  - Satellite link available on or about January 24, 2000 for one month
  - Satellite link will be available two days per week between NLM and SMU 8 AM- 1 PM EST
  - Eight days (Day 1- Day 8) total
  - Terrestrial (via STAR TAP/APAN) link will be available as backup when satellite link not available
    - Tests basic functionality at low throughput.

Demonstration Timeline

- **November 1999**
  - MSU and NLM researchers refine VH Viewer profile procedure
  - Initial readiness testing using terrestrial link
  - SMU uses VH Viewer application and verifies client communication with NLM server
  - Record initial test runs using for comparison with the satellite connection

- **December 1999**
  - Continued use of terrestrial Link by SMU for baseline data gathering
  - Continue debugging communication links if necessary

Demonstration Timeline

- **January 2000**
  - Prepare for 1/24/2000 satellite link start date
    - Initial readiness testing using satellite link dependant upon availability
    - Verify routing working with NASA, CRL and SMU technical groups
    - Turn link over to SMU for application testing

- **February 2000**

- Continue SMU to NLM testing through February 24
- Monitor satellite link and NLM server for readiness as it becomes available for testing each test period
- Link is turned over to PI for application testing using Visible Human Viewer software between SMU and NLM

References

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- Communications Engineering Branch- http://archive.nlm.nih.gov
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